

(12) UK Patent Application (19) GB (11) 2 362 681 (13) A

(43) Date of A Publication 28.11.2001

(21) Application No 0110560.0

(22) Date of Filing 30.04.2001

(30) Priority Data

(31) 9567591

(32) 10.05.2000

(33) US

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(51) INT CL⁷

E05F 15/20 // G01C 21/26

(52) UK CL (Edition S)

E2M MAX4

(56) Documents Cited

WO 00/54007 A1 JP 100008861 A

(58) Field of Search

UK CL (Edition S) E2M MAX4 M11F1

INT CL⁷ E05F, G01C

ONLINE: WPI EPODOC JAPIO

(54) Abstract Title

PASSIVE AUTOMATIC DOOR OPENER

(57) A passive automatic overhead door system which automatically activates a remote door operating device (17) through communication with a global positioning system (18). A vehicle (12) equipped with a GPS receiver (14) and a GPS controller (16) is capable of communicating information to automatically activate a remote door operating device (17) based on predefined vehicle locations and predefined travel directions stored in the GPS controller (16). After programming the GPS controller (16) through a user interface (19) located on board the vehicle (12), there is no further action required from a vehicle's operator in order to activate the remote door operating device (17). The system can also contain an override and a time delay before the activation of the remote overhead door. The speed of the vehicle (12) may also be taken into account when determining the activation of the remote overhead door.

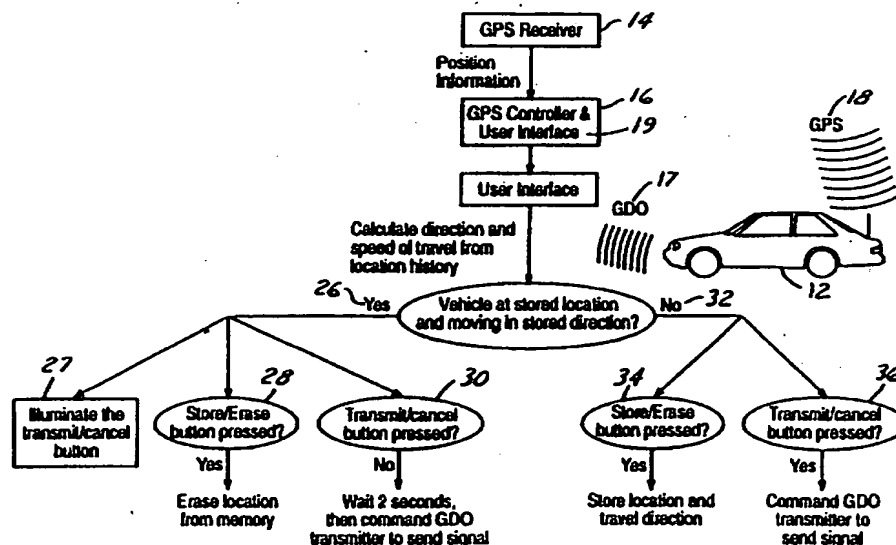
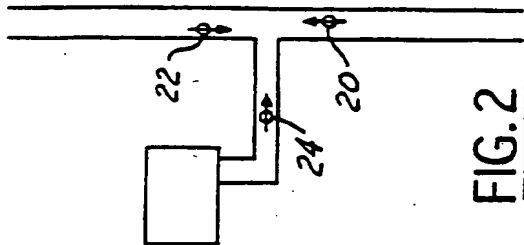
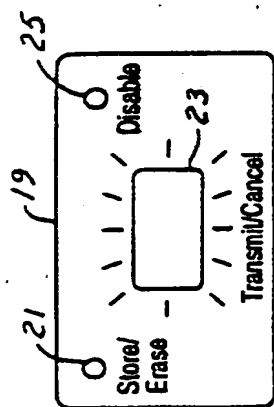
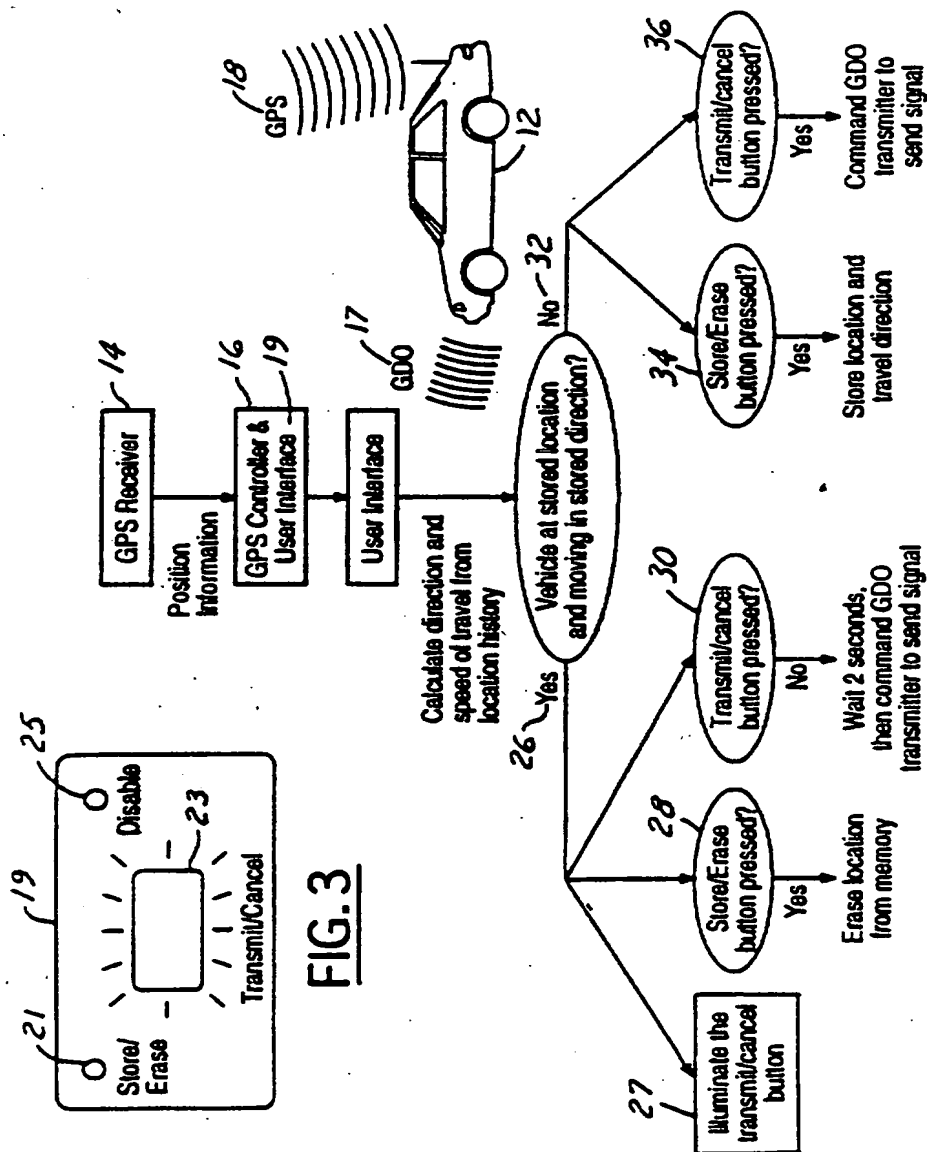


FIG.1

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PASSIVE AUTOMATIC DOOR OPENER

The present invention relates generally to an automatic door opener, and more particularly to passive automatic control of an overhead door.

In the prior art it has been necessary for a vehicle's operator to manually control a remote device that opens and closes an overhead door. There are situations when it is either not practical, or not possible for an operator, i.e. one who is disabled, to activate a remote device in order to open or close an overhead door. In addition, it is a common problem for an operator to drive away from an overhead door, inadvertently failing to activate the remote device to close the door. This may compromise the security of the building attached to the door.

In the luxury automotive market, there is a need for features that not only save the vehicle operator effort, but also reflect the advanced technology available to the automotive industry. Outside of the luxury car market, there are also applications in which it is necessary, or convenient, to have an overhead door automatically open and close for handling deliveries, routing traffic, and a variety of other applications.

It is an object of the present invention to provide a passive, automatic overhead-door operating system. It is another object of the present invention to eliminate the need for a vehicle's operator to activate a remote device in order to control the opening or closing of an overhead door.

It is a further object of the present invention to improve the security of a building, or area, that is accessed by an overhead door or gate mechanism.

In carrying out the above objects and other objects and features of the present invention, a method and apparatus are provided to automatically open and close an overhead door as a predetermined vehicle approaches or departs a predetermined vicinity of the overhead door. In the present invention, after the initial programming, there is no action

needed by the vehicle operator in order to activate the remote operation of the overhead door.

The present invention works in conjunction with a global positioning system (GPS) and a vehicle equipped with a GPS receiver and a GPS controller. The GPS controller has a user interface that allows the vehicle operator to preset the control of the remote overhead-door opener in accordance with several predetermined vehicle locations in order to customise the operation of the automatic door opener. In addition, an override feature is available to allow the vehicle operator to prevent the door from opening or closing if it is so desired as well as operating the overhead door when the vehicle is away from the predetermined locations.

Other objects and advantages of the present invention will become apparent upon reading the following detailed description and appended claims, and upon reference to the accompanying drawings.

For a more complete understanding of this invention, reference should now be had to the embodiments illustrated in greater detail in the accompanying drawings and described below by way of examples of the invention. In the drawings:

FIGURE 1 is a functional diagram of a passive automatic overhead-door control system of the present invention;

FIGURE 2 is an example of typical locations and travel directions that may be programmed into the system of the present invention; and

FIGURE 3 is an illustration of a typical user interface.

The present invention may be readily adapted to a wide variety of applications in which an overhead door, or gate mechanism, is to be activated upon approach or retreat of a vehicle. For purposes of illustrating the invention, a passenger vehicle that approaches and retreats from a garage having an overhead door and a remote overhead-door opener will be used. However, it should be noted that the specific embodiments described herein are for example purposes only. One of ordinary skill in the art is capable of performing

modifications that apply the present invention to a wide variety of applications, without departing from the scope of the invention described and claimed herein. For example, the present invention can be applied to a commercial garage for a delivery service, or in an application in which the flow of traffic is controlled by an overhead door or automatic gate mechanism, i.e. a rental car garage, a parking lot, etc.

Figure 1 is a block diagram of one embodiment of the system 10 of the present invention. A vehicle 12 is equipped with a receiver 14 and a controller 16 for a global positioning system (GPS) 18. In the present invention, the controller 16 has a user interface 19 that allows a vehicle operator to customise the operation of the automatic garage door opener system of the present invention. For example, Figure 3 is an illustration of a typical user interface 19. The user interface 19 may have a "Store/Erase" button 21, a "Transmit/Cancel" button 23, and a "Disable" button 25 that, when activated at predetermined steps during the system's operation will set the operation or override the operation of the system 10. It should be noted that there are a multitude of similar schemes that can be used to accomplish similar results according to the present invention that are too numerous to mention herein. Therefore, the embodiments described herein are intended for example purposes only.

Referring again to Figure 1, the controller 16 is capable of storing a plurality of locations and travel directions that are associated with the desired operation of an overhead garage door, according to the demands of the vehicle's operator. According to the present invention, it is possible to program the controller 16 with a location that automatically activates operation of a remote overhead-door opener, or garage door opener (GDO) 17 when the vehicle reaches the pre-set location. To program the controller, the vehicle operator merely drives the vehicle in the intended direction, and when the vehicle is at the desired location, the operator pushes the "Store/Erase" button. For

example, to set the opening of the door, the "Store/Erase" button is pressed when the vehicle is approaching the garage and is at a desired distance from the garage. To set the closing of the door, the "Store/Erase" button is pressed
5 when the vehicle is driving away from the garage door and is at a desired distance from the garage. In any event, the controller 16 stores the vehicle's location and travel direction in memory. Thereafter, whenever the vehicle is moving in the stored direction and reaches the stored
10 location, based upon information received from the GPS receiver 14, the controller 16 will automatically activate the remote overhead door opener 17, without any input from the vehicle operator.

Figure 2 shows some example locations and travel
15 directions that may be set to activate the garage door. For example location 20 having a travel direction indicated by the arrow, and location 22 having a travel direction indicated by the arrow may be set to activate the opening of the garage door. Therefore, when the vehicle is approaching
20 the garage in either direction, the garage door opener is activated and the door will automatically open. Location 24 having a travel direction indicated by the arrow may be set in the controller to activate the closing of the garage door. In this example, the door will automatically close as
25 the vehicle departs from the garage.

Referring again to Figure 1, an example of the function of the system will be described. As discussed above, the GPS receiver 14 receives the vehicle's position information from the GPS system 18 and transmits it to the GPS
30 controller 16. The GPS controller 16 is used to calculate the direction and speed of travel of the vehicle. The controller 16 determines if and when a vehicle is within a predetermined distance of a stored location and is moving in a stored direction in order to determine if the garage door
35 opener 17 should be activated.

In the case where the vehicle 12 is at a stored location and is travelling in a stored direction 26, the

system 10 makes it possible to automatically operate the garage door opener 17, erase a stored memory location 28, and/or override the door's automatic operation 30. If no action is taken, the overhead door is automatically
5 activated when the vehicle reaches a preset location while travelling in the preset direction. Should it be desired to erase a location and travel direction from memory, the vehicle's operator need only push the "Store/Erase" button located on the user interface 19 at a time when the vehicle
10 is at a stored location and travelling in a stored direction. The location and travel direction will be erased from the controller 16 memory and the door opener 17 will not be activated for that location and travel direction.

To prevent accidental reprogramming, any of several
15 well-known procedures might be used. For example, it is possible to require the "Transmit/Cancel" button be held down while pushing the "Store/Erase" button. Also, a simple means could be provided to allow all programmed locations to be erased at once, such as by pressing the "Store/Erase"
20 button twice.

The override feature 30 will allow the vehicle's operator to avoid the automatic operation of the door opener 17. In one embodiment of the present invention, the "Transmit/Cancel" button is illuminated 27 for a
25 predetermined period of time, i.e. two seconds, before the door is activated. In this embodiment, the time delay allows the vehicle operator the opportunity to override the action of the garage door, if for some reason the operator does not want the action to occur. Merely pushing the
30 "Transmit/Cancel" button, located on the user interface 19, while it is illuminated, will prevent the GPS controller 18 from activating the garage door opener 17. If the vehicle operator takes no action, the door will automatically open or close, depending on the information stored in the
35 controller 16.

In the case where the vehicle is not at a stored location, and/or it is not travelling in a stored direction

32, the "Store/Erase" button is used to set 34 a location and direction in the controller's memory. Also, the door's operation can be overridden 36 to open or close the garage door through manual activation of the door opener 17. For
5 example, if the "Transmit/Cancel" button is pressed at a time when the vehicle is not at a stored location and/or is not travelling in a stored direction, the door opener 17 will be activated.

In another embodiment of the present invention,
10 additional protection against unwanted door activity is provided. The controller 16 can be programmed with the capability of verifying the programmed location and travel direction. Therefore, when the vehicle enters a programmed location, the controller verifies the vehicle is moving at a
15 predetermined minimum speed and was previously a predetermined minimum distance from the garage door before activating the door's operation.

It should be noted that in order to be compatible with existing garage door opener technology, the same signal is
20 transmitted for "Open" and "Close", the effect being to reverse the state of the door, whatever that state is when the signal is received. For new installations, it may be desirable to have separate coded signals for "Open" and
"Close" to ensure, for example, that an already open door is
25 not closed by the signal from an approaching vehicle if the driver fails to cancel the command.

The invention covers all alternatives, modifications, and equivalents, as may be included within the spirit and scope of the appended claims.

CLAIMS

1. A method for automatically activating the operation of a remote overhead-door opener, said method
5 being for a vehicle having a controller having predetermined vehicle location and direction information stored therein and a receiver in communication with a global positioning system, said method comprising the steps of:
determining when the vehicle is at a predetermined
10 vehicle location and the vehicle is travelling in a predetermined direction based on information received from the global positioning system; and
activating the remote overhead-door opener.
- 15 2. The method as claimed in claim 1 further comprising the step of overriding the activation of the remote overhead-door opener.
3. The method as claimed in claim 2 wherein the step
20 of overriding further comprises introducing a time delay before activating the remote overhead-door opener.
4. The method as claimed in any preceding claim wherein said method further comprises the step of verifying
25 a speed of the vehicle to determine the activation of the remote door opener system.
5. The method as claimed in any preceding claim further comprising the step of programming a preset location
30 and preset direction of travel into the controller.
6. The method as claimed in any preceding claim wherein said step of programming a preset location and preset direction of travel further comprises the steps of:
35 erasing an existing preset location and preset direction of travel from the controller; and

programming a preset location and preset direction of travel into the controller.



INVESTOR IN PEOPLE

Application No: GB 0110560.0
Claims searched: 1 - 6

Examiner: Andrew P Jenner
Date of search: 20 September 2001

Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.S): E2M: M11F1, MAX4

Int Cl (Ed.7): G01C, E05F

Other: Online: WPI, EPODOC, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X, P	WO 00/54007 A1 KABUSHIKI KAISHA TOKAI-RIKA-DENKISEISAKUSHO - see abstract	1 at least
X	JP 100008861 A SHARP CORP. - see figures and abstract	1 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.